

REMARKS

Claims 1 to 16 are now pending in the application, with claims 1 and 8 being the independent claims. Reconsideration and further examination are respectfully requested.

In the Office Action, Applicant's claim for priority was acknowledged, but it was noted that a certified copy of the foreign priority application has not yet been filed. In response, Applicant is submitting a copy of the foreign priority application herewith.

Objection was made to the Abstract. In response, Applicant has rewritten the Abstract above, addressing the Examiner's grounds for objection. Withdrawal of this objection therefore is respectfully requested.

Objection was made to Figure 1 for failing to include the legend "Prior Art". In response, Applicant is submitting the accompanying Request For Approval of Drawing Change. Accordingly, withdrawal of this objection is respectfully requested.

In the Office Action, it was noted that Applicant has not submitted an IDS. In response, Applicant notes that an IDS will be filed as soon as the art cited in the corresponding foreign application is provided to Applicant's U.S. attorney.

Objection was made to claims 1 to 8. In response, Applicant has amended the claims above to address the Examiner's grounds for objection. Accordingly, withdrawal of these objections is respectfully requested.

Claims 1 to 8 were rejected under 35 U.S.C. § 112, first paragraph. In the Office Action, it was asserted that the present specification provides little detail pertaining to certain subject matter. In response, Applicant notes that, to the extent that such subject matter is not expressly disclosed in Applicant's specification, it is fully described in the prior art, including in the references cited in the present Office Action. As noted in the Office Action, this also was pointed out in the last full paragraph of page 7 of the Specification. Any of such prior art techniques may be utilized in Applicant's invention. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1 to 8 also were rejected under 35 U.S.C. § 112, second paragraph. In response, Applicant has amended the claims above to address each of the Examiner's grounds for rejection. Accordingly, withdrawal of these rejections is respectfully requested.

Claims 1 to 8 were rejected under 35 U.S.C. § 102(b) over an article titled "Minimum Crosstalk Channel Routing (Gao) or over U.S. Patent 5,596,506 (Petschauer) and were rejected under § 102(e) over U.S. Patent 5,983,006 (Carlson). Withdrawal of these rejections is respectfully requested for the following reasons.

The present invention concerns techniques for determining the timing for a synchronous integrated circuit, in which aggressor wires are divided into a plurality of categories depending on the clocked timing of the aggressor wires in relation to the clocked timing of victim wires, a user selects a mode of operation, and timing delay

predictions are modified based on the effects of the aggressor wires only in those categories corresponding to the mode of operation selected by the user. In this manner, a user is provided with an effective and novel technique to trade off between run times and accuracy in predicting timing delays. Thus, for critical paths, the user might select a mode of operation that evaluates the effects of aggressor wires that have been determined not to be likely to affect the timing of a particular victim wire. On the other hand, for less critical paths, a mode of operation might be selected that would ignore the effects of such aggressor wires.

More specifically, independent claims 1 and 8 are directed to determining the timing for a synchronous integrated circuit, the circuit including a multiplicity of clocked elements interconnected by signal paths. Predictions are formed for timing delays in said signal paths in the integrated circuit. A first such path is selected, wires are traced in the integrated circuit forming the path, hereinafter referred to as victim wires, and adjacent and crossing wires thereto, hereinafter referred to as aggressor wires, are determined. For each aggressor wire, the amount of electromagnetic coupling to the victim wires of the first path is determined. The aggressor wires are divided into a plurality of categories depending on the clocked timing of the aggressor wires in relation to the clocked timing of the victim wires. A user is allowed to select a mode of operation, and for each victim wire, the timing delay predictions are modified based on

Serial No.: 09/344,169

the effects of the aggressor wires only in those categories corresponding to the mode of operation selected by the user.

The foregoing combination of features is not disclosed or suggested by the applied art. In particular, the applied art is not seen to say anything at all about allowing a user to select a mode of operation that controls what categories of aggressor wires will be utilized in modifying previously formed timing delay predictions.

This feature of the invention has been added to independent claims 1 and 8 above, and therefore was not addressed in the present Office Action. Moreover, Applicant has carefully reviewed the applied art references and, although each concerns crosstalk, delay prediction and/or routing, none is seen to disclose or suggest the above-referenced feature of the present invention. For at least this reason, claims 1 and 8 are believed to be allowable over the applied art.

The other claims in this application depend from the independent claims discussed above, and are therefore believed to be allowable for at least the same reasons. Because each dependent claim also recites an additional aspect of the invention, however, the individual consideration/reconsideration of each on its own merits is respectfully requested.

In view of the foregoing remarks, it is believed that the entire application is in condition for allowance, and an indication to that effect is respectfully requested.

Serial No.: 09/344,169

If there are any fees due in connection with the filing of this paper that have not been accounted for in this paper or the accompanying papers, please charge the fees to our Deposit Account No. 13-3735. If an extension of time under 37 C.F.R. 1.136 is required for the filing of this paper and is not accounted for in this paper or the accompanying papers, such an extension is requested and the fee (or any underpayment thereof) should also be charged to our Deposit Account. A duplicate copy of this page is enclosed for that purpose.

Respectfully submitted,

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APPENDIX A

Claims Marked to Indicate Changes

1. (Amended) A method of determining the timing for a synchronous integrated circuit, the circuit including a multiplicity of clocked elements interconnected by signal paths, the method comprising:
 - 1) Forming predictions for timing delays in said signal paths in the integrated circuit;
 - 2) Selecting a first such path, tracing wires in the integrated circuit forming the path[(], hereinafter referred to as victim wires[]], and determining adjacent and crossing wires thereto[(], hereinafter referred to as aggressor wires[]];
 - 3) For each aggressor wire, determining the amount of [perturbation] electromagnetic coupling to the victim wires of the first path;
 - 4) Dividing the aggressor wires into a plurality of categories depending on the clocked timing of the aggressor wires in relation to the clocked timing of the victim wires;
 - 5) [Adding margins of error to the clocked timing of the victim wires independence upon the number of aggressor wires in one or more said categories] Allowing a user to select a mode of operation; and

6) For each victim wire, modifying the predictions formed in step (1) based on the effects of the aggressor wires only in those categories corresponding to the mode of operation selected by the user.

2. (Amended) A method according to claim 1, wherein step (3) is carried out taking into account one or more of the following factors:

- a) whether the aggressor wire crosses or runs parallel to the victim wire;
- b) the signal strengths in the victim and aggressor wires;
- c) the layers in the integrated circuit which the wires are disposed; and
- [d) operating conditions; and]
- d [e)] what type of signal is carried on the [nature of] aggressor wire.

3. (Amended) A method according to claim 1 [or 2], wherein the aggressor wires are divided into three categories of likely, possible or unlikely to affect the timing of the victim wire.

4. (Amended) A method according to claim 3, wherein the [effect only of the likely category are] mode of operation selected by the user causes only the effects of the aggressor wires in the likely category to be taken into account.

5. (Amended) A method according to claim 3, wherein the [effect of]mode of operation selected by the user causes only the effects of the aggressor wires in the likely and possible categories [are] to be taken into account.

6. (Amended) A method according to claim 3, wherein the [effect of]mode of operation selected by the user causes the effects of the aggressor wires in none of the categories [is] to be taken into account.

7. (Twice Amended) A method according to claim 3, wherein the effects of aggressor wires in any category are scaled according to their [respective topological coupling and] respective electrical signal coupling with the victim wire.

8. (Amended) An apparatus [Apparatus] for determining the timing of a synchronous integrated circuit, the circuit including a multiplicity of clocked elements interconnected by signal paths, the apparatus comprising:

- 1) Means for forming predictions for timing delays in said signal paths in the integrated circuit;
- 2) Means for selecting a first such path, tracing wires in the integrated circuit forming the path[(], hereinafter referred to as victim wires[])], and determining adjacent and crossing wires thereto[(], hereinafter referred to as aggressor wires[])];

- 3) Means for determining the amount of electromagnetic coupling, for each aggressor wire, to the victim wires of the first path;
- 4) Means for dividing the aggressor wires into a plurality of categories depending on the clocked timing of the aggressor wires in relation to the clocked timing of the victim wires;
- 5) Means for [adding margins of error to the clocked timing of the victim wires independence upon the number of aggressor wires in one or more of said categories] allowing a user to select a mode of operation; and
- 6) Means for modifying the predictions formed in step (1), for each victim wire, based on the effects of the aggressor wires only in those categories corresponding to the mode of operation selected by the user.